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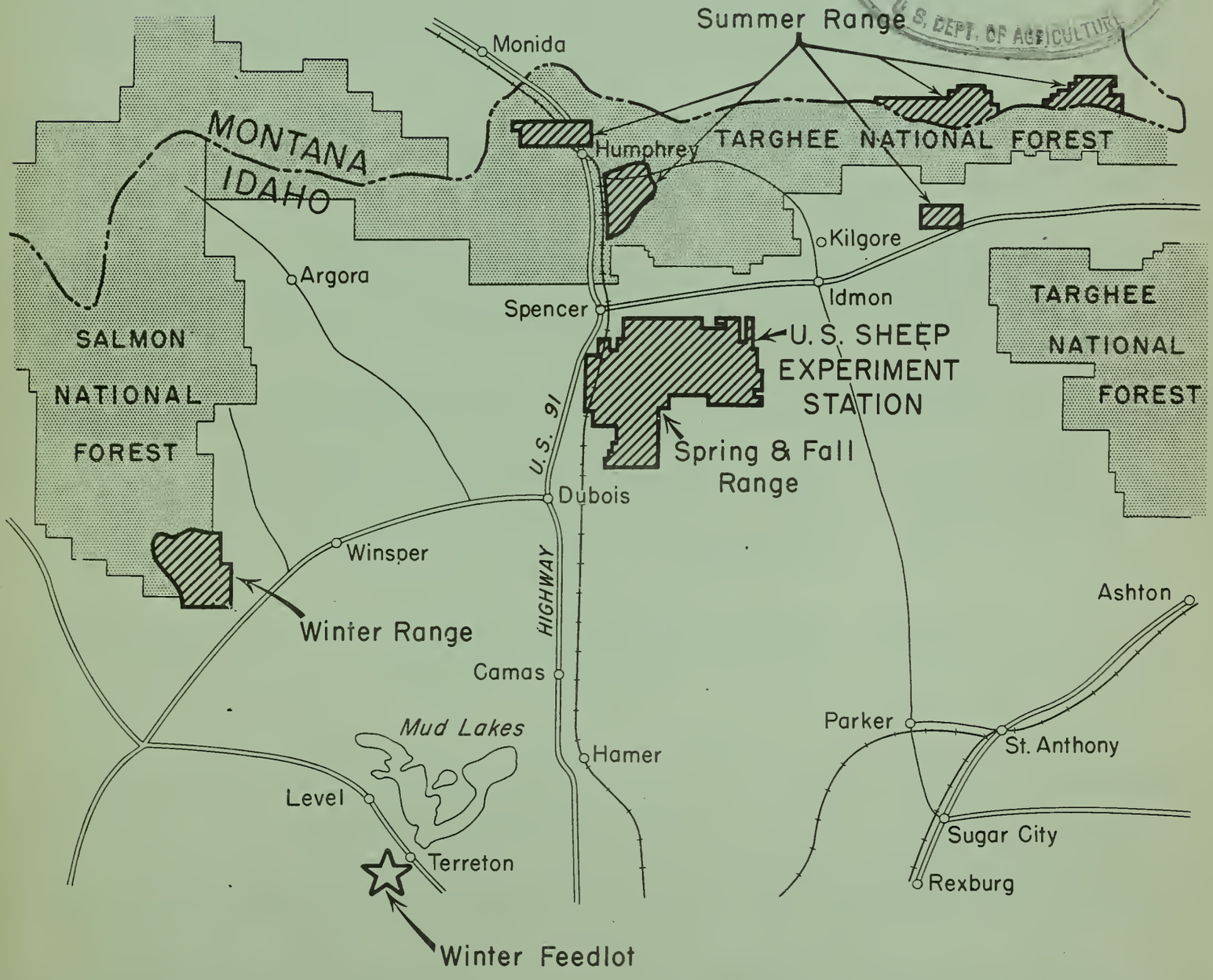
ELEVENTH ANNUAL REPORT OF THE
U.S. SHEEP EXPERIMENT STATION

DUBOIS, IDAHO
JUNE 30, 1948



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ANNUAL REPORT
U. S. Sheep Experiment Station
June 30, 1948

TABLE OF CONTENTS

ROSTER OF PERSONNEL

WESTERN SHEEP BREEDING LABORATORY AND U. S. SHEEP EXPERIMENT STATION
Dubois, Idaho
June 30, 1948

Name	Rating	Date Entered on Duty	General Duties
Nordby, Julius E.	Animal Husbandman	Mar. 1, 1938	Director
Terrill, Dr. Clair E.	Animal Husbandman	July 3, 1936	Genetics and Physiology
Stoehr, John A.	Animal Husbandman	Aug. 28, 1928	Operations
Emik, Dr. L. Otis	Animal Husbandman	July 7, 1941	Physiology and Genetics
Watkins, Jr., Thomas D.	Animal Fiber Technologist	Aug. 4, 1947	Wool Technologist
Wilson, Lowell O.	Foreman of Farm Laborers	July 1, 1943	Assistant, Operations
Schaefer, Chester F.	Clerk	June 22, 1936	Chief Clerk
Hensley, Gladys L.	Clerk	Aug. 4, 1947	Clerk
Taylor, Jessie S.	Clerk	Aug. 25, 1947	Clerk
Watkins, Miriem R.	Calculating Mach. Operator	June 14, 1948	Calculating Machine Operator
Jeffery, Lee C.	Foreman of Farm Laborers	June 7, 1924	General Maintenance, Pumps, Equipment
Rasmussen, Jr., Henry	Farm Laborer	July 1, 1926	Sub-Foreman
Anderson, Daniel	Farm Laborer	Aug. 4, 1947	Shepherd
Goldman, James R.	Farm Laborer	May 1, 1939	Shepherd
Hohman, Max E.	Farm Laborer	April 1, 1935	Shepherd
Howard, John H.	Farm Laborer	Oct. 2, 1944	Camp Tender
Ingram, Parley F.	Farm Laborer	Apr. 20, 1947	Shepherd
Phillips, Walter H.	Farm Laborer	Mar. 16, 1935	Truck Driver
Powell, Fred A.	Farm Laborer	May 11, 1935	Teamster
Swink, Albert B.	Farm Laborer	May 31, 1946	Farm Laborer
Nantz, Mrs. Dorinda R.	Laborer	June 16, 1941	Janitress and Cook

PUBLICATIONS

The following papers have been published or mimeographed by the U. S. Sheep Experiment Station since 1937. The complete list is included again this year for your convenience. Publications which have also been contributed to by the Western Sheep Breeding Laboratory are starred. A number of contributions have been made to livestock journals and the general press that are not included in this series. They are for the most part adaptations of the regular series prepared for the lay reader.

1. Measurement of Reproductive Capacity as an Aid in Selection of Rams of High Fertility (A preliminary report). C. E. Terrill, Proc. of the Amer. Soc. of An. Prod., 1937, pp. 311-316.

2. Artificial Insemination of Ewes. C. E. Terrill and E. M. Gildow, National Wool Grower, 27(12):35, Dec., 1937.

3. Another Experiment on Long Range Paternity in Sheep. C. E. Terrill and E. M. Gildow, Jour. of Heredity, 29(2):77-78, Feb., 1938.

4. Artificial Insemination of Ewes with Transported Semen. E. M. Gildow and C. E. Terrill, Jour. of Amer. Vet. Med. Assoc. N. S. 46(3):157-159, Sept., 1938.

* 6. A Preliminary Study of the Relation Between Fleece Characteristics of Weanling and Yearling Range Sheep. W. V. Lambert, J. I. Hardy and R. G. Schott, Proc. of the Amer. Soc. of An. Prod., 1938, pp. 298-303.

* 7. Reproduction in Range Sheep. C. E. Terrill and John A. Stoehr, Proc. of the Amer. Soc. of An. Prod., 1939, pp. 369-375.

* 8. Selection of Range Rambouillet Ewes. C. E. Terrill, Proc. of the Amer. Soc. of An. Prod., 1939, pp. 333-340.

9. Comparison of the Accuracy of Two Methods of Estimating Fineness of Wool Fibers. Ralph W. Phillips, R. G. Schott, J. I. Hardy and H. W. Wolf, Jour. of Agr. Res. 60(5):343-350, Mar. 1, 1940.

10. A Summary of Three Year's Work in the Transportation of Ram Semen for Artificial Insemination. Ralph W. Phillips, R. G. Schott, E. M. Gildow and C. E. Terrill. Proceedings of the Second National Meeting of Veterinary Surgeons of Italy, 1940. pp. 231-237.

11. The Western Sheep Breeding Laboratory and U. S. Sheep Experiment Station. Julius E. Nordby, Extension Animal Husbandman, Sept., 1940.

13. Some Factors Affecting the Progeny Testing of Rams. Ralph W. Phillips, R. G. Schott, W. V. Lambert and G. W. Brier, U.S.D.A. Cir. 580, 17 pp., Oct., 1940.

*14. The Application of a Rapid Comparator Method for Determining Fineness and Variability in Wool. Elroy M. Pohle, Proc. of the the Amer. Soc. of An. Prod., 1940, pp. 161-168.

15. Comparison of Ram Semen Collection Obtained by Three Different Methods for Artificial Insemination. Clair E. Terrill. Proc. Amer. Soc. of An. Prod., 1940, pp. 201-207.

*16. Growth in Corriedale and Rambouillet Sheep under Range Conditions. Ralph W. Phillips, John A. Stoehr and G. W. Brier, Proc. of the Amer. Soc. of An. Prod., 1940 pp. 173-181.

*17. Sheep Improvement for Range Production. Julius E. Nordby, Idaho Forester 23, 1941, Forestry School, University of Idaho.

19. Columbia Sheep and Their Place in Range Sheep Production. Damon A. Spencer and John A. Stoehr, A.H.D. No. 42, Oct., 1941, 2 pp. (Processed).

20. Targhee Sheep and Their Place in Range Sheep Production. Damon A. Spencer and John A. Stoehr, A.H.D. No. 43, Oct., 1941, 2 pp. (Processed).

*22. Wool Yield Determination in which Small Samples are Compared with Whole Fleeces. Ralph G. Schott, Elroy M. Pohle, Damon A. Spencer, and Glenn W. Brier, A.H.D. No. 50, Jan., 1942, 6 pp. (Processed).

*23. Wool Yields in the Small Side-Sample as Related to Individual Whole-Fleece Yields in Four Breed-Groups of Sheep. Ralph G. Schott, Elroy M. Pohle, Damon A. Spencer and Glenn W. Brier, Jour. of An. Sci. 1(2):137-144, May, 1942.

*24. The Importance of Body Weight in Selection of Range Ewes. Clair E. Terrill and John A. Stoehr, Jour. of An. Sci. 1(3):221-228, Aug., 1942.

*25. Relationship between Weanling and Yearling Fleece Characters in Range Sheep. Elroy M. Pohle, Jour. of An. Sci. 1(3):229-235, Aug., 1942.

*26. Staple Length in Relation to Wool Production. Elroy M. Pohle and Henry R. Keller, Jour. of An. Sci. 2(1):33-41, Feb., 1943.

*28. Staple Length and Its Influence on Shrinkage and Fleece Values. Elroy M. Pohle, and Henry R. Keller, National Wool Grower 33(6): 22-24, June, 1943.

29. Stabilizing Wool and Body Type in White Faced Crossbred Sheep for Western Range Production. Julius E. Nordby, National Wool Grower 33(7):15-17, (8):16-18, July and August, 1943.

*34. Estimation of Clean-Fleece Weight from Grease-Fleece Weight and Staple Length. Clair E. Terrill, Elroy M. Pohle, L. Otis Emik and Lanoy N. Hazel, Jour. of Agr. Res. 70(1):1-10, Jan. 1, 1945.

*35. Clean-Wool Yields in Small Samples from Eight Body Regions as Related to Whole-Fleece Yields in Four Breeds of Sheep. Elroy M. Pohle and L. N. Hazel, Jour. of An. Sci. 3(2):159-165, May, 1944.

*36. Shrinkage and Value by Grades for 1943 Range Wool. Elroy M. Pohle and Henry R. Keller. National Wool Grower 34(6):22-23, June, 1944. (Published in other Wool Growers Magazines).

37. Some Factors Affecting the Blood Phosphorus Level of Range Ewes. W. M. Beeson, Clair E. Terrill and D. W. Bolin, Jour. of An. Sci. 3(2):175-182, May, 1944.

38. The Accuracy of Measurements and Weights of Sheep. Ralph W. Phillips and John A. Stoehr, Jour. of An. Sci. 4(3):311-316, Aug., 1945.

*39. Monthly Changes in Fineness, Variability and Medullation in Hairy Lambs. Elroy M. Pohle, H. R. Keller and L. N. Hazel, Jour. of An. Sci. 4(1):37-46, Feb., 1945.

*41. The Influence of Location and Size of Sample in Predicting Whole-Fleece Clean Yields. E. M. Pohle, L. N. Hazel and H. R. Keller, Jour. of An. Sci. 4(2):104-112, May, 1945.

*42. Wool Off-Sorts, Percentage, Shrink Value. Elroy M. Pohle and Henry R. Keller, Montana Wool Grower 18(6):7, June, 1944. (Published in Other Wool Growers Magazines.)

*44. Looking Forward, The Stabilizing Influence of Research in a Changing Sheep Production Economy. Julius E. Nordby, National Wool Grower 35(6):18-19, 35-36, June, 1945.

51. Effects of Some Environmental Factors on Weanling Traits of Range Columbia, Corriedale and Targhee Lambs. L. N. Hazel and Clair E. Terrill, Jour. An. Sci. 5(3):318-325, August, 1946.

52. Heritability of Weanling Traits in Range Columbia, Corriedale and Targhee Lambs. L. N. Hazel, and Clair E. Terrill. Jour. of An. Sci. 5(4):371-377, November, 1946.

*54. Length of Gestation in Range Sheep. Clair E. Terrill and L. N. Hazel, Amer. Jour. Vet. Res. 8(2 6):66-72, January, 1947.

56. Breed Crosses Used in the Development of Targhee Sheep. Clair E. Terrill. Jour. of An. Sci. 6(1):83-92, February, 1947.

*57. Range Sheep Improvement Through Selection. Clair E. Terrill. National Wool Grower 36(12):17-19, December, 1946.

58. Color on the Legs of Sheep. Its Inheritance in the Columbia and Targhee Breeds. Clair E. Terrill. Jour. Hered. 38(3): 89-92, March, 1947.

59. Effects of Some Environmental Factors on Yearling Traits of Columbia and Targhee Ewes. Clair E. Terrill, G. M. Sidwell and L. N. Hazel. Jour. An. Sci. 6(2):115-122, May, 1947.

*60. It's the Clean Wool in the Fleece that Pays Off. Elroy M. Pohle. National Wool Grower 37(5):19-20, May, 1947.

*61. Statistical Treatment of Trichostrongylid Eggs. L. Otis Emik. Biometrics 3(2):89-93, June, 1947.

*62. Factors Affecting the Estimation of Concentration of Ram's Semen by the Photoelectrometric Method. L. Otis Emik and George M. Sidwell. Journal of Animal Science 6(4):467-475, Nov., 1947.

63. Development of Targhee Sheep. Clair E. Terrill and John A. Stoehr. National Wool Grower, 37(11):13-14, Nov., 1947.

*65. Gestation Period in Sheep. Clair E. Terrill and John A. Stoehr. Sheep and Goat Raiser 28(6):23, March, 1948.

66. Effects of Some Environmental Factors on Yearling Traits of Columbia and Targhee Rams. Journal of Animal Science 7(2): 181-190, May, 1948.

*69. Effect of Feed and Sickness on Wool Growth. Elroy M. Pohle. National Woolgrower 37(6), June, 1947.

*70. High Producing Rams Important. Elroy M. Pohle. National Woolgrower 38(1):21-22, January, 1948.

*71. Fleece Value Increases with Staple Length. Thos. D. Watkins, Jr. For Woolgrowers' Magazines.

*72. Systematic Procedures for Calculating Inbreeding Coefficients. L. Otis Emik and Clair E. Terrill. For Journal of Heredity.

*73. Increasing Accuracy of Selecting Rams. To be processed by A. H. Div., Bur. of An. Ind., U.S.D.A.

*75. Activating Genetic Concept into Range Sheep Improvement. Julius E. Nordby. Northwest Science, January-March, 1948.

ABSTRACTS

The following abstracts have been published by the U. S. Sheep Experiment Station since 1937. Those which have also been contributed to by the Western Sheep Breeding Laboratory are starred. These abstracts are in general of work that has been or will be published and listed in the regular series of publications.

*1. Relationship Between Weanling and Yearling Fleece Characters in Range Sheep. Elroy M. Pohle, Jour. of An. Sci. 1(1):60, Feb., 1942.

* 2. The Importance of Body Weight in Selection of Range Ewes. Clair E. Terrill and John A. Stoehr, Jour. of An. Sci. 1(1):60-61, Feb., 1942.

* 5. Estimation of Clean Fleece Weight from Unscoured Fleece Weight and Staple Length. Clair E. Terrill, Elroy M. Pohle and L. Otis Emik, Jour. of An. Sci. 1(4):357, Nov., 1942.

8. The Effect of Some Factors on the Blood Phosphorus Level of Range Ewes. W. M. Beesen, Clair E. Terrill and D. W. Bolin, Jour. of An. Sci. 2(4):369, Nov., 1943.

* 9. Clean Wool Yields in Small Samples from Eight Body Regions as Related to Whole-Fleece Yields in Four Breeds of Sheep. Elroy M. Pohle and L. N. Hazel, Jour. of An. Sci. 2(4):370, Nov., 1943.

*12. The Gestation Period of Range Sheep. Clair E. Terrill, Jour. of An. Sci. 3(4):434-435, Nov., 1944.

*13. The Influence of Location and Size of Sample in Predicting Whole-Fleece Clean Yield. Elroy M. Pohle and L. N. Hazel, Jour. of An. Sci. 3(4):452, Nov., 1944.

*16. Factors Affecting the Estimation of Concentration of Sperm in Rams' Semen by the Photoelectrometric Method. L. Otis Emik and George M. Sidwell. Anat. Rec. 97(3):69-70, March, 1947.

17. The Nature of Genetic Resistance of Sheep to Trichostrongylid Worms. L. Otis Emik. Jour. An. Sci. 5(4):415-414, Nov., 1946.

18. Inheritance of Color on the Legs in Columbia and Targhee Sheep. Clair E. Terrill, Jour. An. Sci. 5(4):414, November, 1946.

*19. The Effects of Environmental and Hereditary Factors on Trichostrongylid Worm Infestation on Sheep. L. Otis Emik and Paul W. Gregory. Jour. An. Sci. 6(4):477-478, Nov., 1947.

PROGRESS IN DEVELOPING LINES OF COLUMBIA AND TARGHEE SHEEP

Matings of Columbias were continued in 10 lines and 2 test pens in the fall of 1947. The number of ewes bred in lines decreased from 456 in 1946 to 318 in 1947. 157 ewes were mated in crosslines as compared to 124 in 1946. Two Columbia ram lambs were mated in two test pens of 16 or 17, 1st cross Columbia ewes each. In addition, about 160 ewes were involved in Columbia x Targhee crosses. Some of these matings were unintentional, resulting from mixups at breeding time. The offspring from these matings will be used in Columbia test pens.

The 8 Targhee lines which were established several years ago were continued by using one ram in each line. These lines included 269 ewes. The average inbreeding for all possible offspring from these lines in 1947 was 13.5 as compared to 11.5 in 1946. New lines recently started included 9T, 1-, 2-, 3-, 4-, and 5-. Line 9T was started last year with 1st cross Columbia x Rambouillet rams and ewes. Lines 1- to 4- inclusive were started two years ago by mating Corriedale ewes from those lines to different Rambouillet lines. These matings were continued. Corriedale ewes from 1- were bred in line 47, 2- in line 25, 3- in line 53, and 4- in line 54. First cross ram and ewe offspring from the respective lines were also mated together. Line 5- was started this year with offspring of the New Zealand Merino ram. These were mated to a Columbia x Rambouillet ram lamb. This combination was used to retain the fleece qualities of the Merino but to improve body weight and type with Columbia breeding. The New Zealand Merino ram was mated to 37 Targhee ewes; the offspring to be used in line 5-. Two ram lambs resulting from crosses of a Border Leicester ram with Targhee and Rambouillet ewes were used in exploratory matings to Targhee ewes. Six Targhee rams were mated to test pens of 20 and 22 ewes each. These rams included 3 ram lambs and 3 yearlings.

LINE CROSSES IN COLUMBIAS

Studies of the advantages of lambs from line crosses over those from inbred lines were continued during the year. Adjusted (except for inbreeding) averages for 1947 for Columbia weanling lambs are presented in the following table:

Matings	No. lambs	Face covering	Staple length	Weaning weight	Type	Condition
		score	cm.	lbs.	score	score
Cross-line lambs	78	2.79	4.65	83.1	1.58	1.80
Straight-line lambs from lines used in crossing	89	2.86	4.56	79.2	1.73	1.94
All straight-line lambs	257	2.97	4.55	76.9	1.76	1.97

The lines used for crossing excell over all lines for every trait although the differences are slight. Cross-line lambs excell over the straight-lines (from which they come) in every trait. The gains range from 2 per cent for staple length and face covering to 5 per cent for weaning weight, 7 per cent for condition score and 9 per cent for type score.

In the fall of 1947 it was decided to increase the number of cross-line matings by including the 5 largest lines and to defer cross-line matings on the other 5 lines until data already collected could be analysed. Lines 1, 3, 5, 6 and 7 were used for cross lines. Two rams were used from each line. The ewes from each line were divided at random into 4 approximately equal. groups. Two of these were mated to rams of the same line. The other two were mated to rams from 2 different lines. All possible combinations of lines were made. This design was used to give maximum information on the relative merit of the possible line crosses. In addition 63, 2-line-cross ewes were mated to rams of a third line. The ewes mated to each line were divided between the two rams used. Six, 3-line-cross ewes were mated to a ram from a fourth line.

SELECTION PRACTICED WITH COLUMBIA AND TARGHEE WEANING LAMBS

Weaning selection differentials demonstrate the amount of selection actually practiced on each crop of lambs. Considerable later selection is practiced on ram lambs, but much of the effective selection of ewes is made at weaning age.

The selection differentials or advantages of the selected lambs for 1947, in the following table, represent the difference between their average and the average for the entire group after corrections for environmental influences have been made. The percent of lambs saved, based on the number present at weaning, was 74 and 42 percent for ram lambs and 81 and 80 percent for Columbias and Targhees, respectively.

SELECTION DIFFERENTIALS FOR COLUMBIA AND TARGHEE WEANLING LAMBS IN 1947

		Staple length (cm.)	Weaning weight (lbs.)	Type score	Condition score	Face covering score
Columbia						
Rams	Advantage of selected lambs	.04	3.77	.11	.12	.07
	Relative emphasis	.05	.32	.25	.24	.17
Ewes	Advantage of selected lambs	0	1.19	.03	.07	.08
	Relative emphasis	0	.10	.07	.14	.19
Targhee						
Rams	Advantage of selected lambs	.21	4.54	.15	.22	.29
	Relative emphasis	.47	.45	.33	.43	.49
Ewes	Advantage of selected lambs	.06	1.61	.06	.08	.09
	Relative emphasis	.13	.16	.13	.16	.15

Selection differentials and the relative emphasis placed on each trait for Columbias was very similar to those for 1946. Selection differentials for Targhees were generally greater than for Columbias, and for Targhees in 1946. Also more emphasis was placed on face covering, staple length and weaning weight than in 1946. These changes may have been due to the use of an index for selecting Targhee lambs in 1946. An index for Targhee lambs is not yet available because some basic studies have not been completed. However, it seemed advisable to try using the Rambouillet index on Targhees as the breeds are similar in some ways and more progress might be made with a partially correct index than with none at all. The results with this year's selections indicate that this is true.

INCREASING THE ACCURACY OF SELECTION OF COLUMBIA AND TARGHEE RAMS

Much of the gain from selection comes from the choice of rams to become sires. It is often necessary to discriminate between rams born in

different years or raised under different environmental conditions. The differences caused by these environmental effects may be more important than genetic differences. Accuracy of selection for genetic merit or breeding ability may thus be increased by first correcting or adjusting for measurable environmental differences.

Yearly differences and age changes can be adjusted simultaneously by setting up a table giving the average production for each age group for each year involved. Then, for example, the average deviation of a 2-year-old ram born in 1945 from the grand average can be added or subtracted from the record of each ram born in 1945. A correction for increase in accuracy with increasing number of records can also be made in addition to correcting for other important factors such as inbreeding. Ram production records change so with age or years that accurate comparisons between rams of different ages and born in different years are practically impossible before such adjustments are made.

The above adjustments were made on all Columbia and Targhee rams before selections were made in the fall of 1947. In addition, the adjusted fleece records were made available on all sale rams so that prospective purchasers could select rams to fit their needs with greater accuracy.

BREED CROSSES

Various breed crosses were made to explore the possibilities of improving Columbias, Targhees or Rambouillets through use of breeding from the New Zealand Merino or Border Leicester. In addition Lincoln Rambouillets were produced to expand the Columbias and Columbia-Rambouillet and Corriedale-Rambouillet crosses were made to broaden the base of the Targhees. Weanling averages are presented in the following table for each trait for each of the crosses and straight breeds included.

Leicester-Targhees and Lincoln-Rambouillets excelled straight Columbias in every trait except face covering of the Lincoln-Rambouillets. The Lincoln-Rambouillets had heavier weaning weights but more covered faces than the Leicester-Targhees. Leicester-Rambouillets were similar to Columbias but had shorter staple and more open faces. They were probably too coarse to compare with Targhees.

Columbia-Rambouillet and Corriedale-Rambouillet crosses compared favorably with Targhees as in the past. Merino-Columbia crosses were similar to Targhees except for lighter weaning weight, poorer type and heavier folds. A Merino x Columbia ram mated to Targhee test ewes produced acceptable Targhee offspring. The Merino-Targhee lambs were too small with too many folds to compare with Targhees although they were very good in staple length and face covering. The Merino x Columbia ram mated to Rambouillet ewes produced offspring which were very similar to straight Rambouillets.

BREED CROSSES

Breed of Sire	Breed of Dam	No. of lambs	Staple length (cms.)	Weaning weight (lbs.)	Type score	Condi-tion score	Face covering score	Neck folds score
Leicester	Targhee	22	5.15	81.1	1.52	1.78	2.18	1.00
Lincoln	Rambouillet	14	5.00	89.7	1.63	1.83	3.57	1.02
Columbia	Columbia	257	4.55	76.9	1.76	1.97	2.97	1.02
Leicester	Rambouillet	21	4.34	77.8	1.77	1.99	2.41	1.00
Columbia	Rambouillet	20	3.70	77.7	1.94	2.02	3.52	1.15
Rambouillet	Corriedale	68	3.87	77.9	1.88	2.07	3.74	1.32
Merino	Columbia	13	3.91	75.4	1.82	1.78	3.00	1.69
Merino x Columbia	Targhee	15	4.54	79.2	1.56	1.69	4.00	1.22
Targhee	Targhee	234	3.84	78.1	1.66	1.91	3.74	1.14
Merino	Targhee	23	4.03	70.8	1.66	1.80	3.12	1.72
Merino x Columbia	Rambouillet	21	3.69	73.7	1.80	1.99	4.17	1.43
Rambouillet	Rambouillet	135	3.40	74.9	1.95	2.18	3.91	1.44

RELATION OF FLEECE GRADE TO LAMB PRODUCTION WITH COLUMBIA EWES

A preliminary study was made of the available lifetime lamb production of 393 Columbia ewes where the majority of each ewe's fleeces graded 3/8 Blood and 235 ewes, where a majority of each ewe's fleeces graded 1/4 Blood. Ewes with 3/8 Blood fleeces weaned 4.3 pounds more lamb per ewe bred than Ewes with 1/4 Blood fleeces. The advantage was due both to a greater proportion of lambs weaned and higher weaning weights from the 3/8 Blood ewes.

SUPERIORITY IN LAMB PRODUCTION OF EWES HAVING TWINS

A preliminary comparison was made of 804 Columbia and 325 Targhee ewes having twin or single lambs. The advantage in pounds of lamb weaned per ewe lambing was about 39 pounds for Columbia and 53 pounds for Targhee ewes having twins. The advantage was greatest at 5 years of age. Ewes having twins had more lambs born alive of lambs born than ewes having singles. The advantage was 4.5 percent for Columbias and 7.6 percent for Targhees.

This indicates that the production of twins is evidence of high fertility which is also expressed in other ways, such as the higher viability of lambs born. Columbia and Targhee ewes having twins weaned 67 and 90 per cent more lambs respectively per ewe lambing than those having singles. Ewes having single lambs weaned a higher percent of lambs born. The differences were 7 percent for Columbias and 8 percent for Targhees. Of course the single lambs had higher average weaning weights. The advantages were about 10 pounds for Columbias and 13 pounds for Targhees.

COMMERCIAL GRADES OF COLUMBIA FLEECES

		Yearling			Mature		
Sex	Year	1/2 Blood	3/8 Blood	1/4 Blood	1/2 Blood	3/8 Blood	1/4 Blood
		%	%	%	%	%	%
Rams	1942-45	6	60	34	2	58	40
	1946	5	57	38		26	74
	1947	3	56	41	2	40	58
Ewes	1942-45	5	66	29	6	53	41
	1946	4	42	53	3	47	50
	1947	6	63	31	3	47	50

There was little change in the grading of Columbia fleeces from 1946. However, both mature rams and yearling ewes had a higher proportion of fleeces grading 3/8 Blood in 1947.

COMMERCIAL GRADES OF TARGHEE FLEECES

		Yearling				Mature				
Sex	Year	Fine Staple	1/2 Blood	3/8 Blood	1/4 Blood	Fine French	Fine Staple	1/2 Blood	3/8 Blood	1/4 Blood
		%	%	%	%	%	%	%	%	%
Rams	1942-45	8	78	14			2	88	8	2
	1946	8	81	11		3	6	71	20	
	1947	13	63	22	2		7	78	11	4
Ewes	1942-45	7	79	14		2	11	79	7	1
	1946	8	76	16		5	13	70	10	2
	1947	23	62	14	1	4	12	68	15	1

Grading of yearling Targhee fleeces in 1947 was less uniform than in preceeding years. A higher proportion were graded as fine staple and a very few 1/4 Blood fleeces were found this year. In the mature fleeces the proportion of rams grading 3/8 Blood was reduced whereas itwas increased

in the ewes leading to greater similarity between the 2 sexes in fleece grade. Of course, the mature ewes still had higher proportions in the fine grades than the rams.

PROCESSING COLUMBIA AND TARGHEE YEARLING EWE FLEECES INTO MAIN SORTS AND OFF SORTS

It is desirable in processing fleeces into main sorts and off sorts as an aid in a breeding improvement program, to get a record of all sorts for each fleece. When the sorting has been accomplished with a satisfactory degree of skill, the results will make available a clearer understanding of fleece improvement possibilities.

To accomplish the sorting with the degree of accuracy desired, each fleece was tied in a cheese-cloth wrap, approximately two yards being required for each fleece. (These wraps can be used for more than one year.) The fleece was weighed and graded and these records placed on a card with the number of the sheep which produced the fleece and tied securely to the wrap. The fleeces were laid away until shearing was accomplished of all sheep and then brought back to the skirting tables where the sorting was done and weight records made of all sorts. By handling the fleeces in this way, there were no pieces lost to disrupt the records.

The fleeces were removed from the shearing floor as rapidly as they were shorn by six commercial shearers, operating with a power outfit.

The fleeces of 146 Columbia and 79 Targhee yearling ewes were sorted following shearing in June, 1948. The weights of the various sorts and a summary are given in the following tables. Preliminary examination of the sorts grouped into main-sorts and off-sorts indicated that the variability between fleeces was significantly greater than the within fleece variability (main-sort:off-sort ratio). It appeared, from observation, that adjustments for worker differences in amount and types of sorts may become necessary. These observations are strictly preliminary.

SUMMARY OF WEIGHTS OF SORTS OF YEARLING COLUMBIA AND TARGHEE EWE FLEECES

Breed	Fleece grade	No. of fleeces	% of main sort in fleece	Average Weights in Pounds: Main sorts	Off sorts	Total
COLUMBIA	1/4	40	88.4	10.20	1.34	11.54
	3/8	98	89.0	9.13	1.13	10.26
	1/2	8	85.7	7.82	1.31	9.13
TOTAL and AVERAGE		146	88.7	9.35	1.19	10.54
TARGHEE	1/4	2	84.9	10.22	1.84	12.06
	3/8	4	88.8	8.98	1.14	10.12
	1/2	70	87.3	8.25	1.20	9.45
	FS	3	86.4	8.64	1.36	10.00
TOTAL AND AVERAGE		79	87.3	8.35	1.22	9.57

WEIGHT IN POUNDS OF MAIN AND OFF SORTS IN COLUMBIA AND TARGHEE YEARLING EWE FLEECES

Breed	Orig. grade	3	5	6	7	8	11	12	14	15	17	18	20	TOTAL
"K"	1/4		0	30.30	292.02	44.44	0	39.08	0	5.75	0	.10	3.77	415.46
	3/8		0	716.31	194.57	26.13	0	92.22	0	19.32	0	.67	2.34	1015.56
	1/2		53.66	16.13	1.75	0	7.71	2.44	.99	.35	.13	.02	.66	83.84
	TOTAL	0	53.66	762.74	488.34	70.57	7.71	133.74	.99	25.42	.13	.79	6.77	1550.86
"T"	1/4	0	0	0	18.23	2.20	0	3.06	0	.53	0	.02	.08	24.12
	3/8	0	0	31.41	4.52	0	0	2.84	0	1.74	0	0	0	40.51
	1/2	5.13	461.58	94.36	6.91	0	57.73	1.62	19.69	.86	.82	.07	2.08	650.85
	FS	22.28	11.05	1.84	0	0	2.74	.89	1.34	0	.13	0	0	40.27
	TOTAL	27.41	472.63	127.61	29.66	2.20	60.47	8.41	21.03	3.13	.95	.09	2.16	755.75

MAIN SORTS

3. Fine Straight combing (64s)
5. 1/2 Blood (60s & 62s)
6. 3/8 Blood (56s & 58s)
7. 1/4 Blood (48s & 50s)
8. Low 1/4 Blood (46s)

OFF SORTS

11. Burry Fine & 1/2 Blood (60 to 70s & finer)
12. Burry 3/8 Blood & 1/4 Blood (48s to 58s)
14. Stained Fine & 1/2 Blood (60s to 70s & Finer)
15. Stained 3/8 Blood & 1/4 Blood (48s to 58s)
17. Paint Fine & 1/2 Blood (60s to 70s & Finer)
18. Paint 3/8 Blood & 1/4 Blood (48s to 58s)
20. Tags

MAIN SORTS AND OFF SORTS OF THE 1947 CLIP

In cooperation with the Wool Division, Livestock Branch, Production and Marketing Administration, studies were made of the commercial values of the Bureau's wools grown at Dubois, Idaho. The sorting of the clip revealed the following:

SORTS IN PER CENT

Grade and Sex	Top	*Burry	Tags	Paint	Stain	Low	** Crutchings	Grading Locks
Fine Ewes	85.12	4.29	1.43	2.10	2.45	.79	4.85	2.04
Fine Rams	88.94	6.37	0.15	0.30	1.75	-	-	2.51
1/2 Blood Ewes	82.45	4.81	2.05	1.05	4.03	3.47	5.02	2.07
1/2 Blood Rams	86.72	-	0.52	0.73	6.59	3.03	-	2.41
3/8 Blood Ewes	82.86	4.93	0.55	0.93	1.70	4.43	4.89	2.18
3/8 Blood Rams	81.59	7.81	0.39	0.70	2.17	4.56	-	2.78
1/4 Blood Ewes	84.22	4.72	0.67	0.69	2.00	3.64	4.41	1.88
1/4 Blood Rams	85.51	5.93	0.44	0.37	1.61	4.25	-	1.90

* Belly Sort
** Rams were not crutched in 1947.

Laboratory tests on the above scoured wool showed 10.95% moisture, 1.15% residual grease (ether extract) and 1.06% ash, or a total of 13.16% impurities.

SUMMARY FOR INDIVIDUAL GRADE LOTS 1947 CLIP

Lot No.	Description	Net No. Fl.	Gr. Wt.	Clean Yield (%)	Net Adj. Clean weight (lbs)	Percent sort to net grease weight	(%) Shr.	Ave. grease fleece weight (lbs.)	Ave. clean fleece weight (lbs.)	WFA APPRAISAL Value per clean pound	WFA APPRAISAL Total clean value	Ave. clean fleece value	Ave. grease value per lb. Boston	Net grease value per lb. Boston
-1-	#1 Clear	368	3186	51.17	1630	82.41	48.83			$1.34	$2184.20			$ .045
Mature	#1 Burry (Belly)		186	42.88	80	4.81	57.12			1.13	90.40			
Ewes	Paint		68	37.63	26	1.76	62.37			1.06	27.56			
1/2 Blood	Stain		56	37.63	21	1.45	62.37			1.06	22.26			
	Low		103	55.05	57	2.66	44.95			1.26	71.82			
	Tags		14	37.63	5	.36	62.37			1.06	5.30			
	Crutchings		194	45.35	88	5.02	54.65			.98	86.24			
	Grading Locks		59	37.63	22	1.53	62.37			1.06	23.32			
TOTAL and AVERAGE			3866	49.90	1929	100.00	50.10	10.51	5.24	$1.30	$2511.10	$6.82	$0.6495	$0.6045
-2-	#1 Clear	163	1238	51.30	635	82.48	48.70			$1.34	$ 850.90			
Yearling	Paint		5	37.63	2	.33	62.37			1.06	2.12			
Ewes	Stain		99	37.63	4	6.60	62.37			1.06	4.24			
1/2 Blood	Low		64	55.05	35	4.27	44.95			1.26	44.10			
	Tags		56	37.63	21	3.73	62.37			1.06	22.26			
	Grading Locks		39	37.63	15	2.60	62.37			1.06	15.90			
TOTAL and AVERAGE			1501	47.47	712	100.01	52.53	9.21	4.37	$1.32	$ 939.52	$5.76	$0.6263	$0.5813
-3-	#1 Clear	71	829	46.21	383	86.72	53.79			$1.34	$ 513.22			
Rams	Paint		7	37.63	3	.73	62.37			1.06	3.18			
1/2 Blood	Stain		63	37.63	24	6.59	62.37			1.06	25.44			
	Low		29	55.05	16	3.03	44.95			1.26	20.16			
	Tags		5	37.63	2	.52	62.37			1.06	2.12			
	Grading Locks		23	37.63	9	2.41	62.37			1.06	9.54			
TOTAL and AVERAGE			956	45.71	437	100.00	54.29	13.46	6.15	$1.31	$ 573.66	$8.08	$0.6001	$0.5551
-4-	#1 Clear	446	4038	55.05	2223	83.62	44.95			$1.26	$2800.98			
Mature	#1 Burry (Belly)		206	44.07	90	4.27	55.93			1.06	95.40			
Ewes	Paint		66	45.35	30	1.37	54.65			0.98	29.40			
3/8 Blood	Stain		49	45.35	22	1.01	54.65			0.98	21.56			
	Low		158	57.12	90	3.27	42.88			1.09	98.10			
	Tags		5	45.35	2	.10	54.65			0.98	1.96			
	Grading Locks		71	37.63	27	1.47	62.37			1.06	28.62			
TOTAL and AVERAGE			4829	53.67	2591	100.00	46.33	10.83	5.81	$1.23	$3180.88	$7.13	$0.6588	$0.6138

SUMMARY FOR INDIVIDUAL GRADE LOTS 1947 CLIP

Lot No.	Description	No. Fl.	Net Gr. Wt.	Clean Yield (%)	Net Adj. Clean Weight (lbs)	Percent sort to net grease weight	(%) Shr.	Ave. grease fleece weight (lbs.)	Ave. clean fleece weight (lbs.)	WFA APPRAISAL Value per clean pound	WFA APPRAISAL Total clean value	Ave. clean fleece value	Ave. grease value per lb. Boston	Net grease value per lb. Boston
-5-	#1 Clear	146	999	55.26	552	82.09	44.74			$1.29	$712.08			
Yearling	#1 Burry (Belly)		68	44.07	30	5.59	55.93			1.06	31.80			
Ewes	Paint		6	45.35	3	.49	54.65			0.98	2.94			
3/8 Blood	Stain		29	45.35	13	2.38	54.65			0.98	12.74			
	Low		68	57.12	39	5.59	42.88			1.09	42.51			
	Tags		12	45.35	5	.99	54.65			0.98	4.90			
	Grading Locks		35	37.63	13	2.88	62.37			1.06	13.78			
TOTAL and AVERAGE			1217	53.82	655	100.01	46.18	8.34	4.49	$1.25	$820.75	$5.62	$0.6744	$0.6294
-6-	#1 Clear	111	1055	50.62	534	81.59	49.38			$1.29	$688.86			
Rams	#1 Burry (Belly)		101	44.07	45	7.81	55.93			1.06	47.70			
3/8 Blood	Paint		9	45.35	4	.70	54.65			0.98	3.92			
	Stain		28	45.35	13	2.17	54.65			0.98	12.74			
	Low		59	57.12	34	4.56	42.88			1.09	37.06			
	Tags		5	45.35	2	.39	54.65			0.98	1.96			
	Grading Locks		36	37.63	13	2.78	62.37			1.06	13.78			
TOTAL and AVERAGE			1293	49.88	645	100.00	50.12	11.65	5.81	$1.25	$806.02	$7.26	$0.6234	$0.5784
-7-	#1 Clear	326	3259	57.12	1862	83.52	42.88			$1.19	$2215.78			
Mature	#1 Burry (Belly)		165	44.07	73	4.32	55.93			1.06	77.38			
Ewes	Paint		39	45.35	18	1.00	54.65			0.98	17.64			
1/4 Blood	Stain		47	45.35	21	1.20	54.65			0.98	20.58			
	Low		160	62.00	99	4.10	38.00			1.09	107.91			
	Tags		8	45.35	4	.21	54.65			0.98	3.92			
	Grading Locks		52	37.63	20	1.33	62.37			1.06	21.20			
	Crutchings		172	45.35	78	4.41	54.65			0.98	76.44			
TOTAL and AVERAGE			3902	55.74	2175	100.00	44.26	11.97	6.67	$1.17	$2540.85	$7.79	$0.6512	$0.6062
-8-	#1 Clear	55	456	54.17	247	84.92	45.83			$1.22	$ 301.34			
Yearling	#1 Burry (Belly)		28	44.07	12	5.21	55.93			1.06	12.72			
Ewes	Paint		2	45.35	1	.37	54.65			0.98	.98			
1/4 Blood	Stain		15	45.35	7	2.79	54.65			0.98	6.86			
	Low		17	62.00	11	3.17	38.00			1.09	11.99			
	Tags		6	45.35	3	1.12	54.65			0.98	2.94			
	Grading Locks		13	37.63	5	2.42	62.37			1.06	5.30			
TOTAL and AVERAGE			537	53.26	286	100.00	46.74	9.76	5.20	$1.20	$ 342.13	$6.22	$0.6371	$0.5921

SUMMARY FOR INDIVIDUAL GRADE LOTS 1947 CLIP

Lot No.	Description	No. Fl.	Net Gr. Wt.	Clean Yield (%)	Net Adj. Clean weight (lbs)	Percent sort to net grease weight	(%) Shr.	Ave. grease fleece weight (lbs.)	Ave. clean fleece weight (lbs.)	WFA APPRAISAL Value per clean pound	WFA APPRAISAL Total clean value	Ave. clean fleece value	Ave. grease value per lb. Boston	Net grease value per lb. Boston
-9-	#1 Clear	81	1168	52.15	609	85.51	47.85			$1.22	$742.98			
Rams	#1 Burry (Belly)		81	44.07	36	5.93	55.93			1.06	38.16			
1/4 Blood	Paint		5	45.35	2	.37	54.65			0.98	1.96			
	Stain		22	45.35	10	1.61	54.65			0.98	9.80			
	Low		58	62.00	36	4.25	38.00			1.09	39.24			
	Tags		6	45.35	3	.44	54.65			0.98	2.94			
	Grading Locks		26	37.63	10	1.90	62.37			1.06	10.60			
TOTAL and AVERAGE			1366	51.68	706	100.01	48.32	16.86	8.72	$1.20	$ 845.68	$10.44	$0.6184	$0.5734
-10-	Medium Off Sorts		977	44.35	443		55.65			$0.98	$434.34			
-11-	Fine and 1/2 Blood Off Sorts		2557	37.63	962		62.37			$1.06	$1019.72			
-12-	Fine and 1/2 Blood Burry		1003	42.88	430		57.12			$1.13	$485.90			
-13-	Medium Burry		649	44.07	286		55.93			$1.06	$303.16			
-14-	Low 1/4 Blood		235	62.00	146		38.00			$1.09	$159.14			

ANALYSIS OF RETURNS 1947 CLIP

Lot No.	Description	Gr. Cl. Wt.	Net Cl. Wt.	Net Gr. Wt.	Appraisal Value Boston	*Total Expense	Net Appraisal Value	FOB DUBOIS Value per Gr.lb. Cents	No. Sheep
1	Fn. St. Mat. Ewe	3556	3416	7139	$4714.08	$824.42	$3889.66	54.5	821
2	F.C. Mat. Ewe	1606	1536	3379	2088.96	374.46	1714.50	50.7	397
3	Fn. Yrlg. Ewe	1532	1472	3092	2031.36	355.43	1675.93	54.2	444
4	Fn. Rams	1154	1104	2444	1501.44	269.31	1232.13	50.4	215
5	1/2 Bl. Mat. Ewe	1710	1630	3186	2184.20	392.36	1791.84	56.2	368
6	1/2 Bl. Yrlg.Ewe	665	635	1238	850.90	152.61	698.29	56.4	163
7	1/2 Bl. Rams	403	383	829	513.22	93.62	419.60	50.6	71
8	3/8 Bl. Mat. Ewe	2314	2224	4040	2802.24	527.42	2274.82	56.3	446
9	3/8 Bl. Yrlg.Ewe	572	552	999	712.08	130.45	581.63	58.2	146
10	3/8 Bl. Rams	554	534	1055	688.86	127.64	561.22	53.2	111
11	1/4 Bl. Mat Ewe	2094	2024	3544	2408.56	475.94	1932.62	54.5	326
12	1/4 Bl. Yrlg.Ewe	257	247	456	301.34	58.70	242.64	53.2	55
13	1/4 Bl. Rams	639	609	1168	742.98	146.29	596.69	51.1	81
15	X-Breed Crutch.	463	443	977	434.14	108.01	326.13	33.4	
16	Tags	1002	962	2557	1019.72	240.47	779.25	30.5	
18	Fn. and 1/2 Burry	450	430	1003	485.90	105.76	380.14	37.9	
19	3/8 and 1/4 Burry	296	286	649	303.16	69.51	233.65	36.0	
TOTAL		19267	18487	37755	$23783.14		$19330.74	51.2	

Description	Value per Grease lb. FOB Dubois (Cents)	Description	Value per Grease lb. FOB Dubois (Cents)
Fine Mature Rams (Staple)	54.5	Fine Rams	50.4
" " " (F.C.)	50.7	1/2 Bl. Rams	50.6
1/2 " "	56.2	3/8 Bl. "	53.2
3/8 " "	56.3	1/4 Bl. "	51.1
1/4 " "	54.5	X-Bred Crutchings	33.4
Fine Yrlg. Ewes	54.2	Tags	30.5
1/2 Bl. Yrlg. Ewes	56.4	Fn. and 1/2 Burry	37.9
3/8 Bl. Yrlg. Ewes	58.2	3/8 and 1/4 Burry	36.0
1/4 Bl. Yrlg. Ewes	53.2		

*Deductions:

		Cents per Pound
a.	Handler Charge (18487)	5.50
b.	Grading, sorting (37755)	1.50
c.	Scouring (18487)	7.44
d.	Freight (Boston) (18487)	3.50
e.	Trucking (19267)	0.10
f.	Service and Appraisal (18487)	3.75
		21.79

EXPERIMENTS ON SHEEP BRANDING COMPOUNDS

The sheep and wool industry is in need of a branding fluid that will remain clearly legible for 12 months exposure and that can be scoured free in normal scouring solutions. Accordingly, several paints have been prepared by the Wool Division, Production and Marketing Administration, U.S.D.A. Two of these paints designated as DD and AS were tested at this Station on 52 rams in 1948. Rigid tests on these fleeces are now in process.

By process of elimination, the DD type of paint was chosen for use in branding the entire flock at shearing time in May, 1948. This branding paint was applied in blue, green, brown-red, orange-red, yellow and black colors on different groups.

Preliminary observations indicate that the DD brand is much more legible than normal branding fluids after being exposed on the fleece for a year. In addition, it is completely scourable at temperatures slightly higher than normal solutions in 0.5-0.75% sodium carbonate and 0.10% soap solution.

COOPERATIVE WORK WITH THE FOREST SERVICE

Preliminary inventories of heavily and lightly stocked pastures on sagebrush-grass type spring-fall ranges indicate a marked decline in production of desirable forage plants and an increase of undesirable plants. On range heavily stocked, plants classified as desirable and moderately desirable sheep forage produced only 38.1 percent of the total herbage in 1947 as compared to 57.5 percent in 1940. On the other hand, undesirable plants, including sagebrush, produced 61.9 percent of the total in 1947 as compared to 42.5 percent in 1940. During this period, the important grasses decreased 43 percent, the herbs decreased 27 percent while the shrubs increased 12 percent under heavy stocking as compared with light stocking.

The appearance of young sagebrush plants is one of the surest signs of range deterioration. Others include reduced vigor of the desirable species, dead plants or portions of plants of desirable species, and accelerated soil erosion as evidenced by pedestalled plants and margins of lichen lines on rocks.

For the first time in this study, the weights of ewes and lambs showed the effects of the rate of stocking of the range pastures. During the period, April 18 to June 13, when the sheep were on the spring range, ewes on lightly stocked pastures gained an average of 1.9 pounds in body weight while those on heavily stocked pastures lost an average of 8.7 pounds. Lambs on lightly stocked pastures averaged gains of 33.6 pounds while those on heavily stocked pastures average gains of 30.8 pounds. The average net gain on ewe and lamb combined was 35.5 pounds on lightly stocked range as compared to 22.1 pounds on heavily stocked range--a difference of 13.4 pounds in favor of light stocking.

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